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ABSTRACT

This paper analyzes four personal financial planning "expert systems," which institutions of higher education might offer their employees. Such computerized planning systems, like comprehensive plans and professional planners, help families manage their assets and obligations during their lifetimes and plan for distributing their wealth at death. Discussion includes detailed analysis of advantages and disadvantages. Advantages include lasting expertise, consistent decisions, low operating costs, and inexpensive duplication of copies of the expert system computer program. Disadvantages of such systems include their lack of common sense, their inability to see changes in the environment, and their inability to recognize a problem that is not solvable or outside the program's range of expertise. Examination of purchasing such a system for employees to use looks at reasons for its initial high cost and criteria to weigh when selecting a system. These include quality of data-gathering forms and assistance, system flexibility, plan clarity, system reliability and suitability, and potential liability. The analysis looks at each of these in detail particularly at specific planning areas and how they are treated in each of the systems examined for the analysis. A conclusion notes deficiencies and some key issues for institutions to consider. (JB)

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Employee Benefit Plans and Personal Financial Planning with Expert Systems

Following an introduction, this issue of Research Dialogues *presents an analysis of "expert systems," the special computer programs that facilitate comprehensive personal financial planning. The analysis was prepared by Mary Ellen Phillips, M.B.A., C.P.A; Norma L. Nielson, Ph.D., C.L.U., and Carol E. Brown, Ph.D., C.P.A., of the College of Business, Oregon State University.*

Introduction

Most employees build their personal financial plans—both short- and long-term—around their employer-provided benefits. And most educational administrators are aware of the costs of such benefit plans. A recent TIAA-CREF survey of colleges and universities showed that the average employer's share of benefit plan costs in 1989 was 8 percent of payroll for retirement plans, 6.6 percent for Social Security and other mandated benefits, and 6.1 percent for health care plans.

Employers' costs for retirement and insurance plans have been rising. From 1977 to 1989, they increased about 13 percent—from 18.7 percent of payroll to 21.1 percent. One way employers are managing cost increases is to ask employees to pay a larger share of benefit plan costs. Thus over the same period, employees' contributions for benefits increased about 15 percent—from 9.1 percent of payroll to 10.5 percent.

As institutional budgets tighten, the trend toward a larger employee share of benefit plan costs is expected to continue, along with another trend—increasing employee choices from among benefit plan options.

Not all changes are happening because employees are being asked to pay more of the cost. Some strong demographic factors also are involved. Because of changing demographics, benefit plan managers can no longer design their benefit plans by assuming a "typical" employee, such as a married breadwinner with a nonworking spouse at home with one or more children. Today's employees are a rainbow of households and financial situations—single parents, single individuals, nontraditional domestic partnerships, married couples with children, and wage-earning couples. A 1988 study of TIAA-CREF's participants by the Institute for Social Research of The University of Michigan found that 71 percent of married participants had working spouses.

While recognition of employees' diversity gives employees new and more varied choices, it also places new demands on them. As a result, more attention is being given to personal financial planning to assist employees in making their decisions.

Personal financial planning is preparing a lifetime plan, based on the family's or the household's current financial status, that covers all aspects of personal and financial goals, both short-term and long-term. Updating is needed if financial status or the plan's assumptions should change.

The short-term actions considered in a personal financial plan include choosing from options in employer-provided benefit plans and integrating salary and benefits with short-term financial needs. Longer-term goals include saving and investing for retirement, home ownership, school and college tuition, auto purchases, vacations, and rainy days.

Although all these are demanding, retirement planning is especially challenging: It requires determining the amount of income needed to replace salary, retain purchasing power—and last a lifetime. Both the employing institution's retirement plan and Social Security are vital building blocks. However, most of us recognize that in planning for retirement, we ourselves are responsible for filling gaps not met by Social Security and pension income.[1]

TIAA-CREF provides help in the retirement planning process through its counseling staff, retirement planning seminars, telephone response centers, and extensive information materials for institutions and individuals. But comprehensive planning is needed to identify and achieve all the short- and long-term financial goals of employees.

Personal Financial Planning with Expert Systems

By Mary Ellen Phillips, Norma L. Nielson, and Carol E. Brown

Personal financial planning expert systems are special computer programs that make comprehensive plans possible at a reasonable cost, from $200 to $500, about one-tenth or less the cost of plans prepared by professional planners.

Families can purchase a personal financial plan from a planning professional who uses an expert system. If plans prepared by expert systems are offered as

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an employee benefit, employers either can purchase an expert system and provide the service directly to their employees or can hire the services of a system operator who deals directly with the employees. The value of the employer-provided planning benefit is reported as taxable income by the employee, and the cost may be deductible by the employee.

The Scope of Personal Financial Planning

Personal financial planning, whether done on a fee basis by professional planners or by expert systems, provides an individualized plan to help family members manage their assets and obligations during their lifetimes and distribute their wealth at death.

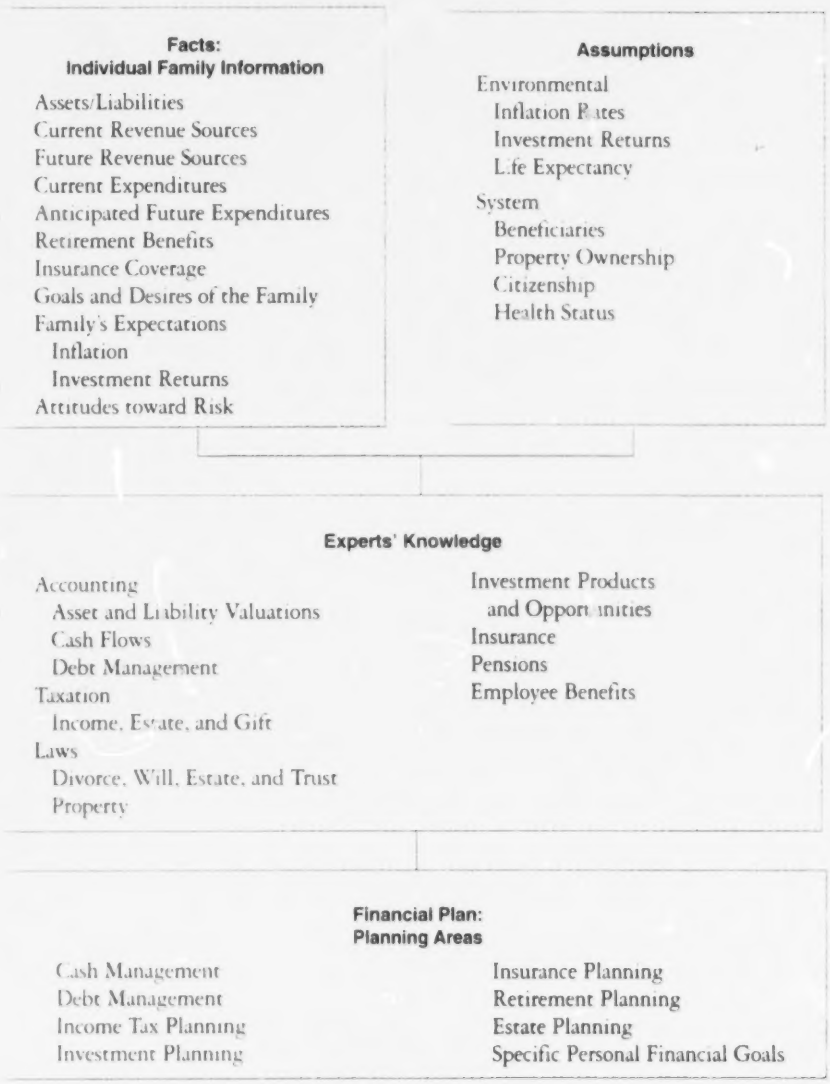
Comprehensive Plans A comprehensive personal financial plan begins with the collection and analysis of personal and financial information (see Figure 1). The plan considers all aspects of a family's personal finances: assets, debts, current and future income, current and anticipated future expenditures, retirement benefits, and insurance coverage. The plan also considers the family's goals and desires, their attitudes toward savings, their expectations regarding inflation and investment returns, and their risk tolerance. Comprehensive personal financial plans are tailored to individual situations, since no two individuals or families have the same financial position, sources of income, spending habits, goals and desires, inflation expectations, or attitudes toward risk.

A comprehensive personal financial plan includes eight major planning areas

- ▲ Cash
- ▲ Debt
- ▲ Income tax
- ▲ Investment
- ▲ Insurance
- ▲ Retirement
- ▲ Estate
- ▲ Personal goals

A comprehensive plan's recommendations include suggestions covering all planning areas and the level of personal savings needed to meet the family's financial goals. If only some areas are included, it is called a partial or modular plan.

Figure 1
The Personal Financial Planning Process



Professional Planners Comprehensive plans may be prepared by professional financial planners.

Professional planners can prepare comprehensive personal financial plans with or without the use of computer programs. If an expert system is used, the planner may assist in preparing the family's information for the plan, setting system parameters, interpreting the plan, and counseling the family about carrying out the plan's recommendations. Although the family will benefit from the professional's services, they add to the cost of the plan.

Expert Systems Expert systems use artificial intelligence techniques to solve complex problems that may have many acceptable solutions. Because no single correct answer-set exists for a personal financial plan, expert systems are excellent tools for preparing personal financial plans.

Currently, personal financial planning expert systems are sold or licensed to accounting firms, financial institutions,

employers, and professional planners. The plans prepared by expert systems are produced for clients of accounting firms, customers of financial institutions, employees, and clients of personal financial planners. Some developers and operators of expert systems only sell plans to their clients, and others sell or lease their software to independent planners, to institutions, and to employers.

Analysis of Systems We analyzed financial plans prepared by four personal financial planning expert systems from the six systems in operation at this writing. We excluded one system because its plans are sold only in conjunction with the services of a professional planner. We tested a modified version of the other system that was omitted. We do not identify the systems in this report.

We asked each of the four system operators to prepare three personal financial plans (see figure 2). The only assistance used in preparing the information for the plans was that routinely provided to customers through toll-free telephone numbers. The operators did not use a planner to evaluate the system-prepared plans.

Figure 2

Expert Systems Tested, Operator, and Income Ranges of Plans

Expert System	Operator	Income Ranges
System A	CPA firm	All incomes
System B	Service bureau	$25,000 - $200,000
System C	Commercial bank	$25,000 - $500,000
System D	CPA firm	All incomes

Expert Systems and Personal Financial Planning

Because personal financial planning solves goal-related problems that may have many acceptable solutions, expert system technology is well suited to the task. Initially, developing an expert system involves two types of experts: those with expertise in the problem-solving field—"the domain"—and those with expertise in representing and structuring the experts' knowledge for computer use—"knowledge engineers."

To develop an expert system in personal financial planning, the planning experts explain the information needed to prepare a quality plan, the reasoning used to arrive at solutions to specific situations, and how the plan reports the solutions. Then, the knowledge engineers represent the planning experts' knowledge and skills in the computer program. Repeated testing refines the knowledge base until the expert system is performing at an acceptable level. The knowledge base of an expert system is stored within the computer so that it is directly accessible to the developer.

System Input Because a comprehensive financial plan requires extensive data, the operator needs a way for the family to provide the details of its personal and financial information and goals. Currently, all the expert system operators use data-gathering forms to obtain and organize a family's information.

The forms are developed to be easily understood and easy to use, and to allow reporting of complete information in a way that can be encoded for computer use. A family reports its information on the operator-provided data-gathering forms. Then the operator enters the information into the system directly from the forms.

The expert system prepares the personal financial plan by using the family's data, the system's assumptions about the environment (see Assumptions, Figure 1), and the experts' knowledge stored in the system's knowledge base. Both the accuracy and completeness of the family's information and the knowledge of the planning experts stored in the knowledge base are critical to the quality of the financial plan.

Advantages and Disadvantages of Expert Systems

Compared with human personal financial planners, an expert system has several advantages and some disadvantages. The advantages include

- Lasting expertise—a system does not retire, quit, or die
- Consistent decisions—a system's ability to solve problems is not affected by stress or personal and job-related problems
- Low operating costs—an expert system can produce personal financial plans with very little marginal cost
- Inexpensive duplication of exact copies of the expert system—it is easy to duplicate a computer program, while training new personal financial planners is a time-consuming and expensive process

The disadvantages include

- Lack of common sense
- Inability to perceive changes in the environment
- Inability to recognize a problem that is not solvable or is outside its range of expertise

These disadvantages suggest that an expert system's knowledge base must be constantly updated and improved, and needs constant oversight by competent and trained developers and operators. The developer must provide both the adaptability to changes in the environment and the common sense.

Purchasing the Planning Service

Two factors make an expert system for personal financial planning expensive to develop. First, the breadth of disciplines used in financial planning is extensive; several experts are needed to cover the domain adequately. Second, expert system development requires computer specialists who are experts in representing and processing the domain knowledge. One developer invested eighty person-years of development time before being satisfied with the system-produced plans.

Besides the large initial investment in system development, the developer

must continue to invest resources to update the knowledge base for changes in income tax laws, insurance and investment products, and the environment. For specific clients, such as employers or other large institutional groups, the system operator may invest resources to customize the knowledge base to include specific information about the client's retirement plan and other employee benefits.

Criteria for Selecting an Expert System Provider

How is an expert system to be selected? The following criteria should be considered when selecting an expert system to prepare personal financial plans:

- Quality of data-gathering forms and assistance provided to prepare the information
- Flexibility of the system
- Understandability of the plans
- Reliability and suitability of the system
- Potential liability for the plans

The Data-gathering Forms and Support Provided

The organization, understandability, user friendliness, and completeness of the forms are vital to assure that the family receives a quality plan.

Assistance with Forms If a family is preparing its data-gathering forms without professional assistance, forms designed to help the family find the information and the values to use are better than ones that do not provide this help. For example, the form might refer the family to a particular line on their income tax return, or if the system is customized for an employer group, it might refer the employee to a particular line on a benefit statement. The planning provider may have a toll-free number or may provide personal assistance. All four systems tested have toll-free help numbers. Some expert systems store the family's data, so that only updated information is needed for subsequent plans.

Completeness of Forms If the data-gathering forms do not request all the vital information, the plan will not be correct. In our tests, we found that some vital information could not be entered on the forms. For example, none of the data-gathering forms provided a place for reporting pension benefits received in a divorce settlement. Figure 3 lists some of the items included or excluded on the data-gathering forms.

Flexibility of the System

A well-designed expert system offers flexibility

- To provide only a part of a comprehensive plan, such as cash management or retirement planning (modularization)
- To modify basic assumptions inherent in the expert system, such as the anticipated rate of inflation (parameterization)
- To modify the plan's recommendations and decide the effects ("what if" analysis)

Partial Planning Not all families feel they need a comprehensive personal financial plan. For example, some families may be interested only in retirement planning and may not want recommendations in other areas. A flexible system allows the family to select only those planning areas that meet their needs.

Handling Variations Some families may prefer certain planning strategies or investments that are not typical of the system-prepared plan's recommendations. A system that allows these preferences to be included in the plan's recommendations may be more helpful. A family is more likely to follow a plan that includes its preferences. If a family's strategies and its goals are incompatible, the expert system will produce an acceptable solution, and the plan will provide an explanation of the rationale used.

Basic Assumptions The projections needed to provide the data for the plan's recommendations use assumptions about inflation rates, investment rates of return, and life expectancy. The assumptions used by the systems tested, shown in Figure 4, are key to realistic projections of savings and investments needed for a desired standard of living in retirement, and savings needed to educate children, purchase a home, or meet any other large, one-time purchase. These same assumptions are used to prepare estimates of a family's need for survivor and disability benefits. Some system operators will modify these assumptions for a company purchasing large numbers of financial plans. For all parameters, the personal financial plans should clearly state what the parameters are and provide verbal and graphic explanations of the effects of differences from them.

Other Assumptions Other system assumptions also affect the projections: property ownership laws—community property versus head-of-household, beneficiary designations for life insurance and pension benefits, citizenship, and current health status. Expert systems include these assumptions in their knowledge base and use them in projections.

Reasonable Limits Depending on the system, the operator may or may not be able to change the parameters for the environmental factors. A system should allow for a family's reasonable perceptions about the environment of the future; otherwise it may produce a plan that is not as useful as a plan that includes those perceptions. On the other hand, if a family's perceptions are outside a reasonable range, they will be overridden by the system and not used to prepare the plan. For example, if a family believed inflation would exceed 20 percent per year indefinitely, the system would not use this extreme belief in preparing the plan but would substitute a reasonable inflation rate.

Inflation Rates System A uses the client's inflation rate, and its data-gathering forms suggest 5 percent. For the other systems tested, the inflation rates are a built-in parameter—the same for all plans.

Life Expectancies All the expert systems evaluated have different built-in parameters for life expectancy. While all were within reasonable ranges, no two were the same.

Figure 3

Inclusion of Selected
Family Information Items in the Tested Expert Systems

Family Information Item	Items Included			
	System A	System B	System C	System D
Citizenship	No	No	No	No
Community property	Yes	No	No	Yes
Remainder interest in a trust or estate	Yes	No	Yes	No
Expected future gifts	Yes	No	Yes	No
Pension benefits received in a divorce	No	No	No	No
Spouse or estate not beneficiary of pension benefits	No	No	No	No
Spouse not beneficiary of life insurance	Yes	No	No	No
Spouse's earned income changes if other spouse is disabled or dies	Yes	No	No	Yes
Death and disability benefits of defined-benefit pension plan	Yes	No	No	Yes

Investment Rates of Return Two systems set a rate of return based on an analysis of a family's actual investments. The other two systems used a predetermined rate of return.

Specific Planning Areas and Recommendations

A comprehensive plan should have both general and specific recommendations in these areas: income tax planning, cash flow planning, debt management, savings and investments, education and other goals for children, other major expenditures, retirement planning, disability planning, life insurance planning, other insurance planning, and estate planning.

All the systems' plans presented information to support the planning recommendations. For families to plan, knowledge about current cash inflows and outflows, financial position, income tax liability, and marginal effective income tax rate is vital. A personal financial plan should include a cash flow statement, a statement of personal financial position (balance sheet), a determination of the current year's income tax liability, and a presentation of the family's marginal effective income tax rate. All the systems' plans had statements of personal financial position. Two systems' plans did not present cash flow statements.

Marginal Effective Income Tax Rate A taxpayer's marginal effective income tax rate is the combined federal and state tax rate payable on the next dollar of taxable income. Because this rate affects many tax planning and investment decisions, understanding it and how it is computed is vital to understanding a plan's recommendations. System B's and System D's plans omitted state income taxes in the computation of the family's marginal tax rate. If a family is a resident of a high income-tax state, this omission causes substantial errors in recommendations.

Understandability of the Output The system-prepared plan should be clear, concise, and easy to understand. If the plan's recommendations and rationale are not understandable, the family may have wasted time and money. The recommendations of the plans we evaluated were clearly stated, although they varied in length and level of planning detail.

Differences among Plans All the systems' personal financial plans covered all the planning areas (see Figure 1), although the relative emphasis differed significantly, with some planning areas covered only with general discussions and others in detail. In addition, discussions and computations about specific assets and liabilities and specific planning recommendations were not always included in the same section of the plans. System D provided its general discussion in a reference manual accompanying its plans, except for estate planning, which was discussed in both its manual and the system-produced plans.

Differences in Recommendations The differences among the plans' recommendations were substantial in some areas in the test cases. These differences were partially caused by

- Differences in the data-gathering forms, such as including or excluding child support
- Use of different values for environmental factors, such as inflation rates
- Use of different assumptions, such as assuming a spouse is the beneficiary of life insurance

We concluded that when differences in the reported information caused differences in the recommendations, comparisons of the specific recommendations of the plans were not appropriate. If the differences were due to environmental factors or the system rules, comparisons were appropriate. Because the plans differently classified certain planning area elements, comparison of the systems' plans required careful reorganization of the recommendations.

Income Tax Planning Effective income tax planning keeps income taxes at the lowest possible level and emphasizes the intermediate and long-range effects of recommendations and changes in the current financial position of a family. These long-range planning techniques can include the advantages of tax-deferred annuities and tax-exempt investments. System B's plans did not cover income tax planning, while the others extensively covered this area. System A's

Figure 4

Expert Systems' Assumptions When Profiles Were Run

Assumption	System A	System B	System C	System D
Inflation rates				
General	Client's expected rate; forms suggest 5.0%	5.0%	5.4%	4.0%
Real estate		8.5%	5.6%	4.0%
Education		7.0%	6.1%	4.0%
Investment returns (before tax)	Weighted average of actual returns	8.5%	Actual returns after recommended investment changes	8.0%
Life expectancy	Average plus five years	Men: 82 Women: 85	Top 5%	Average[1]
Health status considered	No	No	Average life expectancy	No
Property ownership	Data-gathering forms specified, correctly treated	Ignores community property laws	Ignores community property laws[2]	Not specified on data-gathering forms but correctly treated
Community versus separate				
Beneficiaries				
Pension benefits	Assumes spouse or estate	Assumes spouse or estate	Assumes spouse or estate[3]	Assumes spouse or estate
Life insurance	Designated beneficiary	Assumes spouse	Assumes spouse[3]	Assumes spouse

[1] Has been changed to 90 years.
[2] Has been revised and now correctly treats community property.
[3] Could specify beneficiary if optional data-gathering forms used.

and System C's plans included both federal and state income taxes. System D's plans covered only federal income taxes and specifically stated that state income taxes were omitted. For most families, the omission of any federal or state income tax considerations causes substantial planning errors.

Cash Planning and Debt Management The effective management of cash is critical if a family is to meet its current living costs and current debts, and provide cash for future goals. All tested plans included sections on cash flow planning and debt management. System D's plans were limited to cash inflows, as its data-gathering forms only asked for tax-deductible cash outflows and not personal cash expenditures. All tested plans recommended maintaining cash reserves for emergencies, but the amounts varied.

Investment Planning While none of the plans offered specific investment recommendations, they all recommended percentages of investment diversification by type and degree of risk. To compare the suggested investment diversification, we grouped the recommendations into three categories: cash and fixed-income investments, equity securities, and real estate—the most general categories used by any of the system's plans. The plans' recommendations for diversification of investments reflected the amount of invested assets as well as a family's risk tolerance. System C's plans were the most conservative. Their recommendations excluded equity investments in two of the three tested cases; the third recommended 11 percent equity investments, compared with at least 40 percent recommended by the other systems.

Financing Future Goals All families have future goals for important but infrequent expenditures. These goals may include financing a college education; paying for a wedding; buying a home, vacation home, or rental property; buying a boat or airplane; or buying a business.

System B's and System C's plans specifically discussed the family's expenditure goals that we entered on the data-gathering forms. System A's and System D's plans did not provide this discussion. System C's plans considered borrowing to finance future goals and showed the percentage attainable for each specified goal. System B's plans recommended that all families rethink their goals if they had insufficient cash.

System C built automobile replacement into its recommendations: The other systems' plans required this to be a specific goal. With the exception of funding college educations, System D's plans did not cover future goals.

Financing College Educations All plans provided for financing college educations as a personal goal. In their data-gathering forms, all systems provided cost ranges for college educations to help the family estimate these values. The cost ranges seemed reasonable.

Retirement Planning All systems' plans included retirement planning. Each system had a different technique for computing life expectancy and used different rates of inflation and investment return. We concluded that if these were the only factors that differed among the plans, the recommendations could be meaningfully compared. For all plans, the differences in the information requested and the differences in the definitions, when identical information was requested, resulted in plan recommendations that were not comparable.

Insurance Coverage All systems' plans covered life insurance planning for sur-

vivor income protection and disability income protection. System A's plans provided specific recommendations for health, property, auto, and umbrella liability insurance. The other systems' data-gathering forms did not ask for the information needed for these recommendations, but their plans included a general discussion of property and liability insurance. System C's plans provided a general discussion of health insurance coverage. System B's and System D's plans did not cover health insurance.

Disability Income Protection All systems' plans included recommendations for sources of income during periods of total disability. However, definitional and family information differences precluded meaningful comparisons of the recommendations. Each system's data-gathering forms defined income differently, and although we attempted to report the same values on all the systems' forms for the same case, we did not succeed.

Some defined-benefit pension plans provide periodic disability income payments. System B's and System C's data-gathering forms did not provide for inclusion of these disability payments, thus overstating the recommended purchase levels of disability income insurance. Only System C's data-gathering forms requested current health status, while the others assumed all breadwinners were able-bodied. One plan recommended disability income insurance for a disabled person.

All systems' plans covered disability income insurance. System A's and System B's plans discussed the taxability of disability income insurance, while the other two systems' plans did not cover tax treatment. All but System D's plans discussed the reduction or loss of disability income insurance once the recipient was eligible for unreduced retirement benefits from Social Security.

Survivor Income Protection Survivor income comes from life insurance proceeds, death benefits from pension coverage (lump sums or periodic payments), Social Security under specified circumstances, and investment income. Each system's data-gathering forms asked the family to estimate the income needed by survivors. Again, each system defined income differently, causing the recommendations to vary from one plan to another, which precluded meaningful comparisons of the recommendations.

Also, System B's and System C's data-gathering forms did not include a way to enter expected income or death benefits for a survivor from a decedent's pension plan. Thus, these systems' plans underestimated the assets available for the surviving family members. System D assumed that survivor income from a deceased spouse's defined-benefit pension plan would be available to the survivor, while the other systems did not make that assumption. Only System D's data-gathering forms allowed us to report a change in the surviving spouse's earned income upon the death of the other spouse. Therefore, the other three systems' plans under- or over-estimated future earned income in cases where a change was anticipated.

The data-gathering forms of Systems A and B allowed us to report life insurance beneficiaries. The other two systems assumed the spouse was the beneficiary. We concluded that for System C's and System D's plans, assets available to a surviving family would be overstated if insurance benefits had been assigned either to a former spouse in a divorce action, to ensure child support, or to a nonspousal beneficiary.

Estate Planning The estate planning sections of all the systems' plans were general in nature. These general discussions were expected, since none of the systems' operators offer legal services, and estate planning is mostly a function of law. All systems' plans computed the gross taxable estates of our test cases, estimated the potential estate expenses, and computed the potential estate tax liability, with only minor differences among the computations.

Recommendations and Implementation

Each of the tested systems produced comprehensive financial plans based on the reported information, the goals expressed, and the calculations and projections made by the system. The plans of Systems C and D were particularly professional in their appearance—in hardcover notebooks, laser printed, indexed, and easily referenced. These systems also included the original data-gathering forms printed out to allow the family to check for accuracy and as a reminder and record.

All the personal financial plans provided a summary of the recommendations made in their various sections. Two systems' plans provided a glossary of financial, accounting, tax, and insurance terms, particularly useful for families without an extensive background in financial planning.

All the expert-system providers have professional planners. These planners are available for an additional fee to assist clients in understanding their plans' recommendations and implementing the recommendations.

Reliability and Suitability of the System

If an expert system truly represents personal financial planning expertise, the resulting plans will be of equally high quality as plans prepared by a qualified financial planner. An assessment of the expertise of the developer is critical in system selection.

Testing Plans Two approaches can be taken to evaluate financial plans produced by an expert system. One approach is to rely on the professional reputation of the system operator and the other is to test the product.

An employer might wish to test each available system for the potential use of employees. Ideally, such evaluations should be based on test cases of either real or assumed family data. Test cases need to be carefully developed so that they cover a full range of financial and personal situations and types of client users, individual or family, employee or self-employed.

Updating the Knowledge Base The advantages of a personal financial planning expert system rapidly disappear unless the system's knowledge base is constant-

ly updated. Regular updates are needed to incorporate new financial products and changes in tax laws. If a system developer is stable, financially sound, and committed to the product, the necessary system updates will be made to the knowledge base. All the systems tested are updated annually; some changes were made to the tested systems as a result of this research project.

Liability Risk An employer who sponsors personal financial planning as an employee benefit may be concerned about the potential liability risk for expert-system-prepared financial plans that may be deficient. This risk can be mitigated if the expert system operator is selected with due diligence, that is, with careful and documented attention to quality, thoroughness, commitment to privacy, absence of product bias, and good experience and reputation.

If the expert-system-produced plans cover just one area, such as retirement planning, that limitation should be made clear to the employee. Similarly, if comprehensive personal financial planning is offered, the employer should determine that the plans cover all desired planning areas.

Benefit Taxability Under current federal income tax laws, employees who receive personal financial planning services as an employee benefit must report the value of the service as additional earned income. Employees who itemize deductions and have miscellaneous deductions that exceed 2 percent of their adjusted gross income can claim an offsetting deduction.

Personal financial planning benefits do not qualify under Section 132 of the Internal Revenue Code for the favorable income tax treatment of some other benefits. The value of a financial planning benefit is subject to unemployment taxes and Social Security and Medicare taxes.

Conclusion

We concluded that all the expert systems reviewed can provide useful and comprehensive personal financial plans. At the same time, we recognize that a key quality element is the basic data-gathering forms: They must allow reporting of all relevant information needed for a quality plan.

For the most part, we gave the data-gathering forms high marks, recognizing the difficulties involved in developing standard forms to meet a multiplicity of financial and personal situations. However, we would suggest certain changes. For example, not all the data-gathering forms allow for reporting anticipated changes in the family's primary sources of earned income. A minor change to the forms could add information that, for some families, should be included.

Also, some of the forms did not provide for the reporting of gifts or of income and beneficial interests in estates and trusts. Two systems' data-gathering forms did not allow for reporting death and disability benefits from defined-benefit plans, and thus overstated the need in those cases for life and disability income insurance.

We observed that certain changes in family situations deriving from changing demographics could be added to the data-gathering forms. For example, financial planning should include changes in assets and their ownership, income, or child support resulting from divorce or remarriage. While a family's financial planning usually does not involve an anticipated future divorce, we found that the data-gathering forms did not always allow for reporting existing obligations or benefits relating to a prior divorce or remarriage.

The systems' plans differed in the depth of coverage of the various areas encompassed by personal financial planning. We also noted that the assumptions regarding inflation rates, investment rates of return, and life expectancies differed among the systems, presumably reflecting the expectations and philosophies of the system operators. However, because their impact on the recommendations in personal financial plans is substantial and can have a long-term effect on the financial well-being of the client, we concluded that all the plans should provide extensive discussion of their assumptions and should give illustrations of financial outcomes resulting from differences in these assumptions.

Although underlying benefit philosophies may differ among institutions, most employers in the field of education play a considerable role in providing benefit plan coverage and in aiding employees in maximizing the value of that coverage. In addition to deciding how comprehensive personal financial planning fits into their institution's benefit philosophy, administrators who consider adding expert-system-prepared personal financial plans as a benefit will also want to determine if employees are willing to pay for it. They will need to consider as well the stages in an employee's career when the service can be used to the best advantage, which employees to cover, and the level of planning to provide—limited or comprehensive.❑

Endnotes

TIAA-CREF, *1990 College and University Employee Retirement and Insurance Benefits Cost Survey* (New York: TIAA-CREF, 1990): 9, Table 3.

TIAA-CREF, "Trends in Payments for Employee Benefits—A Review of the TIAA-CREF Retirement and Insurance Benefits Cost Surveys, 1977-1989," *Research Dialogues*, no. 29 (April 1991).

University of Michigan, Institute for Social Research, "Survey of Financial Behavior and Income Security: TIAA-CREF Participants, TIAA-CREF Annuitants" (Fall 1988) (unpublished).

Marvin H. Greene, "Employees Need Help in Making Savings Decisions," *National Underwriter* (Life & Health/Financial Services edition) (December 2, 1991): 17.

Professional personal financial planners include attorneys, certified public accountants, and others qualified by such accrediting organizations as Certified Financial Planners, Chartered Financial Consultants, Chartered Life Underwriters, Accredited Personal Financial Specialists, and members of the National Association of Personal Financial Advisors.